BRIDGE OVER LITTLE PINE CREEK
(State Route 1026, Section 002 Bridge)
State Route 1026 over Little Pine Creek, 2.01 Kilometers
(1.25 miles) east of the Village of Bendertown
Jonestown Vicinity
Columbia County
Pennsylvania

HAER No. PA-435

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
Philadelphia Support Office
U.S. Custom House
200 Chestnut Street
Philadelphia, Pennsylvania 19106

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HISTORIC AMERICAN ENGINEERING RECORD
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(State Route 1026, Section 002 Bridge) HAER NO. PA-435

Location: State Route 1026 over Little Pine Creek, 2.01 kilometers (1.25 miles) east of the Village of Bendertown, Jonestown Vicinity, Columbia County, Pennsylvania
UTM: 18.391260.4556160
Quad: Stillwater, PA, 1:24,000

Date of Construction: 1915

Builder: John Elder for Columbia County

Present Owner: Commonwealth of Pennsylvania
Department of Transportation
Harrisburg, PA 17101-1900

Present Use: Vehicular bridge

Significance: This bridge is an early example of a reinforced concrete open-spandrel arch bridge, noteworthy for its modern method of construction, and unusual shape and design. The two ribs of the arch and the two small posts that transfer the weight of the deck to the ribs are very slender (especially given the bridge's 1915 date), appearing to test the limits of building in this medium. Also significant is the elegant elliptical shape of the arch and the decorative concrete parapet, with a light, star-shaped design, rather decorative for a bridge of such a small size, and unique among concrete bridges of a similar date in Pennsylvania. The bridge was built during the heyday of the Good Roads Movement of the late nineteenth and early twentieth centuries that sought to revamp old roads and erect new ones to accommodate the fledgling automobile movement. Columbia County became involved in the movement, holding Good Roads Day throughout the county one month before the construction of the Bridge over Little Pine Creek. The building of this technologically innovative bridge in this rural area of Columbia County illustrates how the good roads movement impacted Columbia County during the first decades of the twentieth century.

Project Information: This bridge was surveyed and subsequently listed on the National Register of Historic Places as part of a statewide bridge survey conducted by the Pennsylvania Department of Transportation which began in 1982. The bridge is currently slated for replacement due to its deteriorated condition. To mitigate the adverse effect, the State Historic Preservation Office stipulated HAER documentation of the bridge within its setting. This documentation was undertaken to fulfill this stipulation.

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INTRODUCTION

The Bridge over Little Pine Creek (S.R. 1026, Section 002 Bridge) is located in the Jonestown vicinity, in Fishing Creek Township, Columbia County, Pennsylvania. For purposes of this report, the crossing will be referred to as the Bridge over Little Pine Creek. The bridge, constructed by Columbia County in 1915, was listed on the National Register of Historic Places on June 22, 1988 for its architectural and engineering significance. It is a noteworthy example of an open-spandrel concrete arch bridge, which uses minimal materials in a simple, well-executed design of reinforced concrete construction. Despite its deteriorated condition, the bridge remains in a relatively unaltered state, possessing a high level of architectural integrity. This report describes the bridge and its engineering importance and documents its local historical and cultural significance.

PHYSICAL DESCRIPTION OF BRIDGE AND SETTING

The bridge carries the east-west bound S.R. 1026 over Little Pine Creek, approximately 2.01 kilometers (1.25 miles) east of the village of Bendertown in Fishing Creek Township, Columbia County, Pennsylvania. The State of Pennsylvania currently owns the bridge, after purchasing it from Columbia County on January 1, 1936. The immediate area around the bridge is rural in nature, as it has been since the bridge's construction in 1915. Gently rolling hills covered with patches of woodland and marked with large areas of cultivated fields and pasture characterize the landscape of the region. Heavy brush and trees shroud the bridge itself. The Little Pine Creek, that flows north-south through the area, is not navigable, and the vegetation in the area is very dense.

The bridge is a single-span, open spandrel, double-ribbed reinforced concrete arch bridge. It measures 12.19 meters (40 feet) in length, and has a curb to curb width of 4.93 meters (16.2 feet). The bridge is currently posted with a 6356.0 kilogram (7 ton) weight limit, and is restricted to one lane of vehicular traffic. There are no sidewalks and minimal shoulders. The deck of the bridge is supported by reinforced concrete floor beams that measure 13.41 meters (44 feet) in length. These concrete floor beams are heavily deteriorated with exposed rebars. Some steel I-beams, installed during numerous repairs to the bridge, are bolted into the deck to support the concrete floor beams. The conerete floor of the bridge is covered with bituminous pavement marred by small potholes and significant cracking.

The north and south sides of the superstructure display a decorative concrete balustrade. The balustrade rises approximately 1.21 meters (four feet) above the roadway surface across the span, while approximately 1.52 meter high (five foot) walls cap the north and south sides

of the abutments. The balustrade is pierced by decorative panels displaying pairs of delicate star-shaped designs. Seven sets of panels, each containing two star motifs, pierce each elevation. The stars themselves consist of reinforced concrete, and many of the panels have been broken or are severely deteriorated. A molded top rail, built of concrete, caps the balustrade. The parapet walls over the abutments also display molded concrete caps. The inner face of the southern parapet wall, toward the eastern end of the bridge, contains the bridge plaque.

The bridge is supported by a concrete substructure, consisting of two parallel open-spandrel arch ribs on the north and south sides. These ribs consist of reinforced concrete, and numerous areas of cracking reveal the rusted reinforcement bars. The two narrow ribs of the arch rise 5.18 meters (17 feet) above the streambed at the highest point of the arch. The weight of the deck is transferred to the arch ribs by single sets of two narrow posts located east and west of the center of the bridge. Transverse bracing between the arches consists of simple, concrete struts. These ties exhibit severe spalling and cracking, and the corroded rebars appear on the east side.

The east and west abutments are built of smooth-faced concrete. Both are severely deteriorated and show many areas of spalling and unsound delaminated concrete on the faces. Much of this is due to the steep approaches, which have resulted in numerous repairs. Stay bolts were installed in 1969, and some areas were backfilled with coarse material to provide additional support in 1971. The backfilled area now appears to be covered with asphalt, but the material is partially obscured by the dense bramble that has overtaken the wing wall areas.

The Bridge over Little Pine Creek represents a good example of a reinforced, ribbed concrete arch bridge, a type that became popular during the first two decades of the twentieth century. Concrete arch bridges were experimented with as early as the last quarter of the nineteenth century. The first concrete arch bridges, such as the one in Prospect Park, Brooklyn, in 1871, were built solely of concrete. By the late 1880s, the process of reinforcing the concrete with metal developed, which allowed for larger spans, lighter members, and for greater flexibility with arch curves. The ribbed concrete arch bridge developed when the fill material in the spandrels was removed due to the new reinforced concrete technology, creating an open spandrel design. The heavy, filled barrels were lightened into one or more ribs, creating more elegant designs that contrasted dramatically with earlier closed spandrel concrete bridges that looked heavy and massive in comparison (Commonwealth of Pennsylvania et al. 1986:157-59).

Built in 1915, the Bridge over Little Pine Creek used this new and then fairly innovative technology in a rural part of Columbia County. Few people may have noticed the engineering prowess of the bridge designer, John Elder, since the bridge lay along a narrow, rural road.

This bridge is also notable for making use of the new reinforced concrete technology on a relatively small bridge and doing so in a very well-designed manner. The arch of the bridge follows an elegant, elliptical shape. The ribs and columns that transfer the weight of the deck to the double-ribbed arch are very slender, appearing to test the limits of this new method of bridge construction. Minimal materials are used in this simple, well-executed design which makes use of the advantages of what was then fairly new in bridges, reinforced concrete arch construction.

LOCAL HISTORICAL BACKGROUND

The bridge's rural setting has not changed drastically since the area was originally settled in 1783 by Irishman Daniel McHenry. Other settlers followed after the conclusion of the Yankee-Pennamite Wars secured land titles for the pioneers. Fishing Creek Township's sparse population was composed of itinerant trappers and farmers growing wheat, buckwheat, oats, corn, rye and potatoes. Primitive early roads were developed to provide access to local mills. Around 1820, a person named Kennedy erected a woolen mill on Little Pine Creek in Fishing Creek Township; yet it only operated a few years before closing. An 1876 map shows a saw mill standing along the creek to the northeast of an earlier bridge in the area of the current Bridge over Little Pine Creek (Beers 1876:21). The road, which roughly followed the path of the existing S.R. 1026, and the earlier bridge were likely installed so that residents in the vicinity of Bendertown could reach the mills without having to ford Little Pine Creek (Battle 1887:221; Nassaux-Hemsley 1993:2-1; Beers 1915:28; Yocum n.d.; Pawlowski 1976:2).

Fishing Creek Township submitted a petition in 1914 to the Commissioners of Columbia County to erect a new bridge over the Little Pine Creek near the residence of a farmer's widow, Susan Wilson. The Bridge Dockets show that a two-part iron bridge existed on the proposed site. The first section measured 3.048 by 3.66 meters (10 by 12 feet) and crossed the creek bed; this was followed by a short roadway, then a second crossing measuring 3.96 by 3.66 meters (12 by 13 feet) which spanned a mill race. Since the mill race was no longer extant, the proposed new bridge did not extend over its path (Columbia County Road and Bridge Dockets 1914:502-503). Columbia County Road and Bridge Dockets, which extend back to 1870, provide no information about the construction of the earlier iron bridge, suggesting that its erection probably predated the records system (Columbia County Road and Bridge Dockets 1914-15; Pawlowski 1976:2; Hanford 1901:267).

The petition having been favorably received, the commissioners put the bridge out for contract bids. On June 17, 1915, the county awarded the contract for a reinforced concrete bridge to John L. Elder of Ebensburg, Pennsylvania, for $3,450 (*The Morning Press*, June 18,

1915). Four months later, the completed bridge was inspected by Columbia County Commissioners G. S. Fleckenstine and O. Fred Lenhart and by County Engineer, G. A. Flink. Referred to in *The Morning Press*, the Bloomsburg area local newspaper, as the "Schultz Bridge," the structure was one of three that the county approved for use on October 18, 1915 (*The Morning Press*, October 19, 1915). A search of *Who's Who in Engineering* and *A Biographical Dictionary of American Engineering* for early to mid-twentieth-century years does not reveal any professional affiliations of either the contractor or the County Engineer.

The Bridge over Little Pine Creek is unusual with its rather decorative scheme and innovative use of reinforced concrete construction, given its remote location over an unnavigable river. Yet, despite its innovative design, it is based in part on earlier precedents. The use of the arch formation in bridge construction is part of a long tradition, first appearing in stone arches during ancient times and becoming popular in the United States from the colonial period through the nineteenth century. Stone arch bridges bore weight loads through compression thrusting outward through the arch onto substantial abutments. Concrete construction later worked in much the same manner. When steel reinforcements, which appeared in Europe in the 1880s, were added to the concrete, the structure could then support weight through tension as well, strengthening its capacity.

The first reinforced bridge appeared in the United States in 1889 in San Francisco's Golden Gate Park. Despite the structure's increased capacity due to its concrete and steel composition, its designers fashioned it to look like a stone bridge. Popular tastes found concrete monolithic and unattractive in appearance, perceiving concrete to be less substantive than stone. By 1910, new finishing techniques improved the appearance of concrete bridges, and designers felt less of a need to embellish them with faux-stone finishes. Modern thinking now deemed that bridge designs should emphasize linear elements, with parabolic curves, attenuated ribs, slender columns, and less obtrusive abutments becoming typical features. Decoration appeared largely in molded members and decorative balustrades. Not only did the new designs offer more of a modern, streamlined look, but their open-spandrel construction significantly decreased the bridge's dead load, the portion of a structure's capacity used in supporting the weight of the bridge itself (Steinman 1957:271-277; P.A.C Spero & Company 1991:91; Mock 1972:10, 11, 84; Commonwealth of Pennsylvania et al. 1986:157).

The Bridge over Little Pine Creek was built as part of this new trend toward building bridges with reinforced concrete. One of the earliest uses of the concrete arch form appeared in the principality of Luxembourg with the 85.34 meter-spanned (280 foot) Pont Adolphe in 1903. Pont Adolphe's monumental size became more characteristic of the open-spandrel concrete arch bridge form, as opposed to smaller sized bridges, such as the span over Little Pine Creek (Mock 1972:88). Yet, when the Bridge over Little Pine Creek was built, open-spandrel

concrete arch bridges of any size were rare in America, not becoming widespread until the 1920s and 1930s.

Documentary research failed to reveal precisely how a small bridge project in rural north-central Pennsylvania was able to obtain and employ a relatively innovative design. Yet, a strong likelihood exists that the county received technical guidance from activists in a fledgling movement to develop highways in America. A review of 1915 issues of *The Morning Press*, Columbia County's local newspaper, shows a pattern of area support for a popular Progressive-Era cause known as the Good Roads Movement. For example, County Commissioners declared May 26, 1915 to be Good Roads Day, and scores of local volunteers came out to clean and repair the county's roadways (*The Morning Press*, March 20, 1915). This show of public support occurred less than one month before commissions awarded John Elder the contract to build the Bridge over Little Pine Creek.

The Good Roads Movement began around 1892 when recreational bicyclists, known as wheelmen, began publishing a magazine entitled *Good Roads* in an effort to tout the benefits of highway development. Some of the advantages they publicized included higher land values, opening of new commercial markets, better distribution of manufactured goods, improved education, cessation of rural isolation and poverty, and increased ability of farmers to access and participate in the political process. The League of American Wheelmen were joined in their cause by the American Automobile Club, forerunner to AAA. Farmers and other rural dwellers were initially unreceptive, regarding the movement as elitist and fearing that property taxes would be hiked to pay for roads that mainly the leisure class would enjoy. However, early proponents recognized that rural residents stood to benefit greatly from road development, and tied their movement to the push to institute a rural free mail delivery (RFD) system. Paved, passable roads were crucial if mail delivery routes were to be established in the countryside. The RFD system was tested in neighboring Montour County in 1896. Beginning in 1904 it expanded into Columbia County, and it would continued to develop up through the 1915 construction of the Bridge over Little Pine Creek, "as fast as conditions warrant[ed]" (Beers 1915:39; Seely 1987:12, 25).

The United States Department of Agriculture set up an Office of Road Inquiry (ORI) in 1895, which later became the Bureau of Public Roads. The Bureau would shape the direction of road development well into the 1930s. At the turn of the century, most roads served to connect widely dispersed farms to local markets, and roads and bridges had either been privately built or were put in place by local officials with no training or coordination with other road projects. The ORI sought to accumulate information about road design and construction, disseminate it to local officials and contractors, and coordinate efforts among the various entities involved in road and bridge building. There being no source from which locals could access

information about construction designs, materials and techniques, the ORI served as a clearinghouse, publishing reams of technical assistance and sending field agents around the country to assist local planners. The ORI's laboratories processed hundreds of requests by local contractors for materials analysis each year. By the time the Route 1026 bridge was built in 1915, the ORI had taken its mission to break down rural isolation to heart, and reformulated itself as the Office of Public Roads and Rural Engineering. The new agency's goals were to strengthen its technical advisory role, focus on raising construction and efficiency standards, and to foster cooperation between the federal government, the new state highway departments, and local agencies (Seely 1987:3, 11-14, 17, 22, 40, 43).

In the 15 years before the construction of the Bridge over Little Pine Creek, automobile ownership in the United States jumped from 8,000 to well over 2,000,000. A rush was on to erect highways and bridges to accommodate the new mode of transport. The new Pennsylvania Department of Highways, formally organized in 1911 under the Sproul Road Act, took over responsibility for 296 county roads, and also provided $2,000,000 to supplement 50% of construction costs to improve township roads. In 1915, the Commonwealth undertook the construction of 15 bridges in and around Columbia County. Although the Bridge over Little Pine Creek remained a county responsibility, its construction was probably made possible by the availability of new funds from the state and technical instruction from the Office of Public Roads and Rural Engineering (Beers 1915:40; Steinman 1957:265; Nassaux-Hemsley, Inc. 1993:n.p.).

Many small tributaries of the Susquehanna River flow through Columbia County. By 1914, the county had over 200 bridges in its inventory to maintain, most of them wooden. Frequent flooding repeatedly damaged these vulnerable crossings or swept them away entirely. The continual and costly maintenance brought about a plan to begin replacing wood bridges, most built in the nineteenth century, with more sturdy iron or concrete bridges. Although the bridge construction was contracted out to local builders, designs and specifications for the structures were set by the county commissioners, who likely obtained them from Office of Public Roads and Rural Engineering publications or field agents. The Commissioners had several priorities to meet when embarking on a road or bridge construction job. Along with reducing maintenance costs, and capitalizing on the sudden availability of state funds and federal technical expertise, they also sought to alleviate the high rate of male unemployment plaguing Columbia County. Three months before Elder received his contract to construct the Bridge over Little Pine Creek, the Commissioners instituted a new policy requiring all contractors to utilize at least 80% local labor.

Elder's bridge represented a good opportunity to train unemployed workers of Columbia County in new techniques of steel-reinforced concrete bridge construction. The particular

bridge form represented the wave of future bridge design, but it had been little used thus far in the United States: first, because America lacked artisans skilled in constructing the mold forms necessary to make the various bridge components; and second, because most bridges heretofore had been constructed by the railroads, whose specifications called for steel bridges. Once the technical instructions for training workers to build the forms became available from the Office of Public Roads and Rural Engineering, local contractors could learn necessary skills, but still use local laborers to pour concrete into the molds, a process that did not require previous skills or training. These workers became trained in a growing sector of construction, which would secure their employment in future projects (Plowden 1974:297; *The Morning Press,* March 5, 1915; Pawlowski 1976:1-3).

The Bridge over Little Pine Creek was built during an important time in the institutionalization of a new form of transportation, the highway. Progressive-era reformers wanted a coordinated national system of roads, which would not only benefit urban commercial interests and wealthy cyclists and motorists, but that would also serve to connect rural areas, such as Columbia County, with urban centers and larger towns. Although no evidence survives to reveal how Flink and Elder obtained the progressive design for the Bridge over Little Pine Creek, the vigorous activity documented in Columbia County of the Good Roads Movement and the Rural Free Delivery system makes their sponsored institution, the Office of Public Roads and Rural Engineering, the most probable source. By bringing bridge-building technology formerly unavailable outside Europe (no American university even had a highway engineering program until Harvard initiated one in the 1890s) to the American hinterlands, the inheritors of the Good Roads Movement transformed fledgling highway programs into a unifying and democratizing force for a nation at the dawn of the modern era.

SOURCES OF INFORMATION/BIBLIOGRAPHY

Primary Sources

Columbia County, PA. *Columbia County Road and Bridge Dockets, Original Papers*. 1914-1915. On file at the Columbia County Recorder of Deeds Office, Bloomsburg, PA.

Secondary Sources

Newspaper Articles

"Three New Bridges Were Inspected by County Comrs." *The Morning Press* (October 19, 1915):1. On file at the Bloomsburg University Library, Bloomsburg, PA.

"Bridge Contract Let Yesterday; Low Bid $3450." *The Morning Press* (June 18, 1915):1. On file at the Bloomsburg University Library, Bloomsburg, PA.

The Morning Press (March 20, 1915):1. On file at the Bloomsburg Public Library, Bloomsburg, PA.

"Commissioners to Have Contractors Work County Men." *The Morning Press* (March 5, 1915):1. On file at the Bloomsburg Public Library, Bloomsburg, PA.

Maps

Beers, F. W. and Company. *Columbia and Montour Counties, Pennsylvania: From Recent and Actual Surveys and Records*. New York: F. W. Beers and Company, 1876.

Books

Battle, J. H., ed. *History of Columbia and Montour Counties Pennsylvania*. Chicago: A. Warner & Co., 1887.

Beers, J. H. *Historical and Biographical Annals of Columbia and Montour Counties, Pennsylvania*. Chicago: J. H. Beers and Co., 1915.

Commonwealth of Pennsylvania, Pennsylvania Historical and Museum Commission and Pennsylvania Department of Transportation. *Historic Highway Bridges in Pennsylvania*. Harrisburg, PA: Commonwealth of Pennsylvania, 1986.

Hanford, George. *Directory of Columbia and Montour Counties Pennsylvania with Map.* Elmira, NY: Advertiser Association, 1901.

Mock, Elizabeth B. *The Architecture of Bridges.* New York: Museum of Modern Art and Arno Press, 1972.

Nassaux-Hemsley, Inc. *Comprehensive Plan. Phase I Background Studies.* Chambersburg, PA: Nassaux-Hemsley, Inc., 1993. On file at the Columbia County Commissioners Office, Lightstreet, PA.

Pawlowski, Marlene. *Columbia and Montour Historic Transportation Study.* Bloomsburg, PA: Columbia-Montour Joint Planning Commission, 1976. On file Columbia County Commissioners Office, Lightstreet, PA.

P.A.C. Spero & Company. *Delaware Historic Bridges Survey and Evaluation.* Wilmington, DE: Delaware Department of Transportation, 1991.

Plowden, David. *Bridges: The Spans of North America.* New York: The Viking Press, 1974.

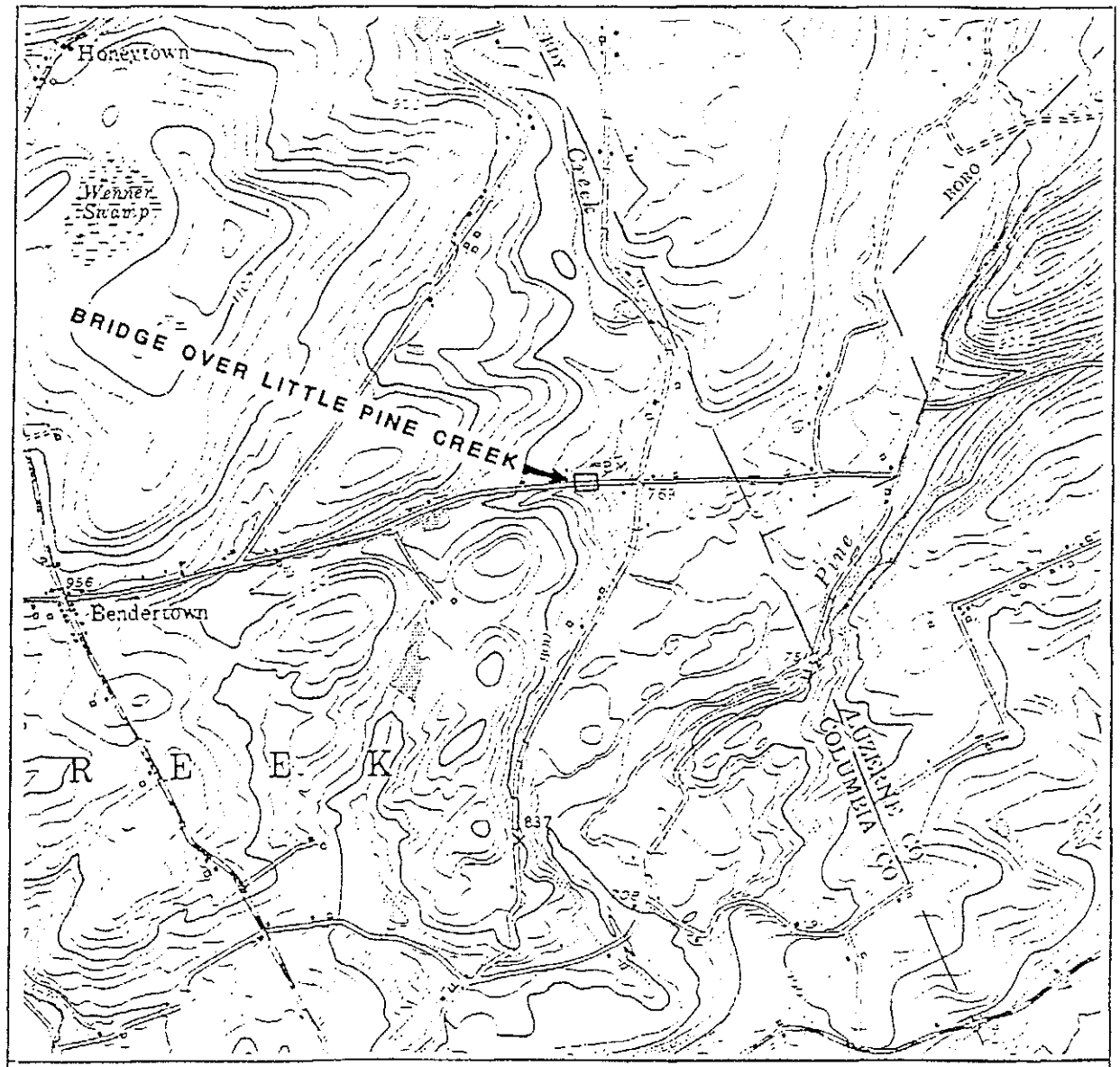
Seely, Bruce E. *Building the American Highway System: Engineers as Policy Makers.* Philadelphia: Temple University Press, 1987.

Steinman, David B. and Sara Ruth Watson. *Bridges and Their Builders.* New York: Dover Publications, 1957.

Yocum, Kenneth. "The History of Fishingcreek Township." n.d. In vertical file at Columbia County Historical Society, Orangeville, PA. Excerpted from J. H. Battle, *The History of Columbia and Montour Counties Pennsylvania.* Chicago: A. Warner and Co., 1887.

Unpublished Reports and Documents

A thorough search was undertaken of repositories for original photographs, and none were found to survive. Repositories searched include the archives of the Bloomsburg Morning Press (now the Press Enterprise), the archives and files at the Columbia County Courthouse, the Bloomsburg Public Library, the vertical files at the Columbia County Historical Society in Orangeville, PA, the Bloomsburg University Library and Archives, the Bridge Records of the Pennsylvania Department of Transportation, District 3-0, the Pennsylvania State Archives, Harrisburg, PA, and the Pennsylvania Historical and Museum Commission, Harrisburg, PA.


Honeytown
Wenner Swamp
Creek
BORO
BRIDGE OVER LITTLE PINE CREEK
956
Bendertown
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R E E K
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AUXILIARE COLUMBIA CO.
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609.5 meters
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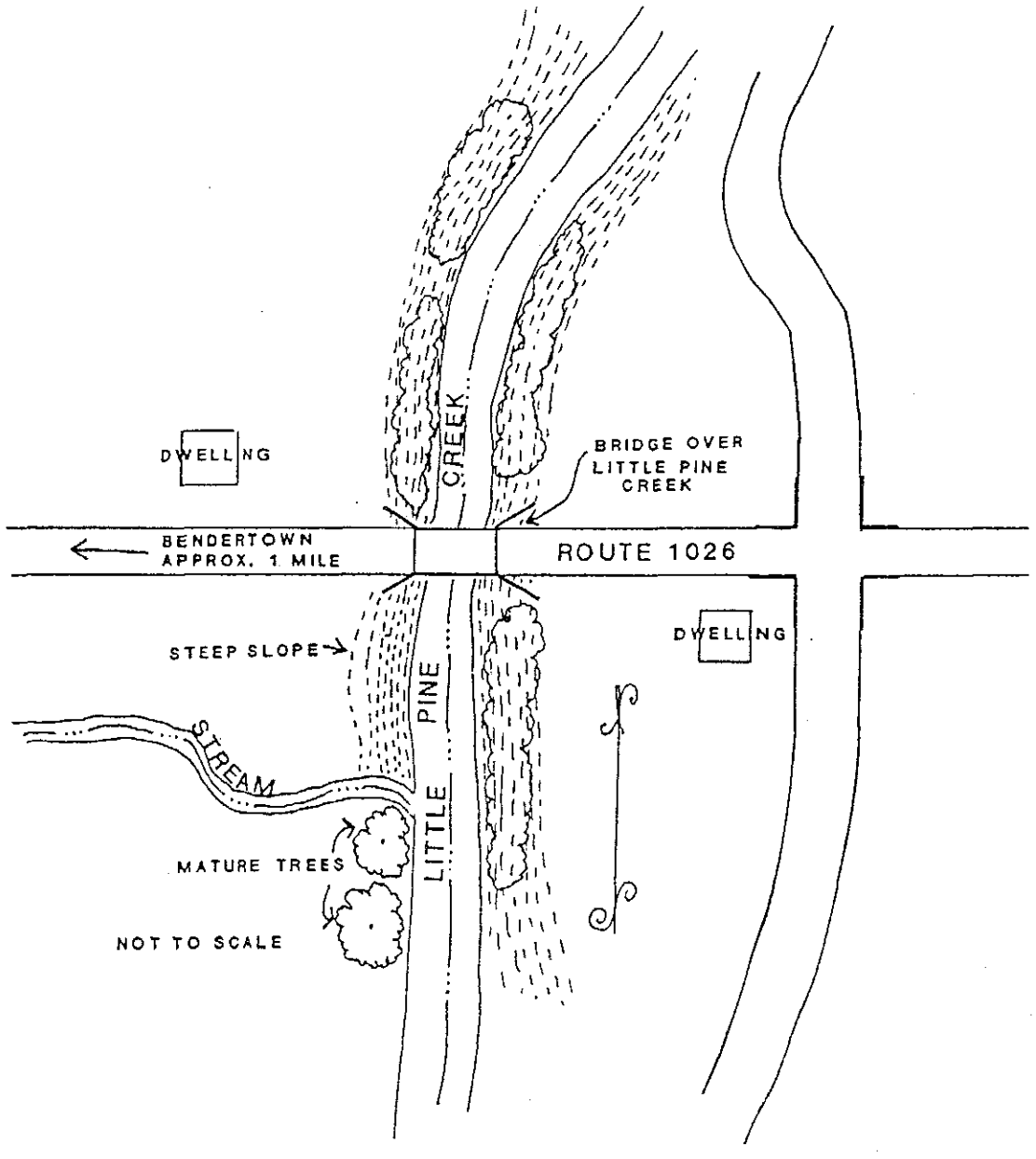
BRIDGE LOCATION MAP
NATIONAL REGISTER BOUNDARY
SOURCE: USGS, 1976
PREPARED by CHRS, Inc.
STILLWATER, PA.



SITE PLAN

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